

**REMARKS**

The Office Action mailed on April 9, 2002, has been received and reviewed.

Claims 1-5, 11-17, 25-28, and 33-38 are currently pending in the application. The allowance of claims 11-17 and 33-38 is noted with appreciation. Each of claims 1-5 and 25-28 stands rejected.

Reconsideration of the above-referenced application is respectfully requested.

**Rejections Under 35 U.S.C. § 102(e)**

Claims 1-4 and 25-27 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 5,712,185 to Tsai et al. (hereinafter "Tsai").

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Tsai describes a method for forming shallow trench isolation structures in a semiconductor substrate. The method of Tsai includes providing a substrate that includes a silicon oxide layer thereover and a layer of silicon nitride over the silicon oxide layer. A sacrificial layer of either polysilicon or silicon oxide is formed over the silicon nitride layer. A photomask with apertures for defining trenches in the semiconductor substrate is then formed over the sacrificial layer. Next, the trenches are formed through each of the layers and in the semiconductor substrate.

The photomask is then removed and the silicon nitride layer descummed, or etched laterally beneath the overlying sacrificial layer. A thin oxide layer is then formed on the surfaces of the semiconductor substrate that are exposed within the trench. The trench is filled with a suitable dielectric material, such as tetraethylorthosilicate (TEOS), which also fills the descummed regions of the silicon nitride layer and forms a dielectric layer over the sacrificial layer. The dielectric

layer and sacrificial layer are then removed to expose the surface of the silicon nitride layer and to form an isolation structure from the dielectric material. Upon removal of the silicon nitride layer, regions of the dielectric material that filled the descumed portion of the silicon nitride layer extend laterally beyond the outer periphery of the trench and over portions of the silicon oxide layer. Exposed portions of the silicon oxide layer are then removed from the surface of the semiconductor substrate, leaving only the isolation structures and portions of the silicon oxide layer that are shielded thereby.

By way of contrast with the method disclosed in Tsai, independent claim 1 recites a method of forming an isolation structure. In the method, a layer of isolation material is applied "over [a] buffer film layer, with major surfaces of [the] layer of isolation material and [the] buffer film layer in contact . . ." In addition, the applied layer of isolation material fills a trench that extends through the buffer film layer and an underlying dielectric layer, and into a semiconductor substrate underlying the dielectric layer.

It is respectfully submitted that Tsai does not expressly or inherently describe that a layer of isolation material may be applied over a buffer film layer with major surfaces of the buffer film layer and the layer of isolation material in contact. Instead, Tsai describes that the dielectric material that fills the trench may contact only vertical edges of the silicon nitride layer which is located between the sacrificial layer and the silicon oxide layer. In the method of Tsai, the major surface of the silicon nitride layer (an example of buffer film layer) cannot be contacted by the layer of isolation material because a sacrificial layer of either polysilicon or silicon oxide already covers the major surface of the silicon nitride layer.

Accordingly, it is respectfully submitted that Tsai does not anticipate each and every element of independent claim 1.

It is, therefore, respectfully submitted that, under 35 U.S.C. § 102(e), independent claim 1 is allowable over Tsai.

Claims 2-4 are each allowable, among other reasons, as depending either directly or indirectly from claim 1, which is allowable.

The method of independent claim 25 includes, among other things, “applying a layer of isolation material over [a] buffer film layer, major surfaces of [the] layer of isolation material and [the] buffer film layer in contact, [the] layer of isolation material substantially filling [a] trench . . .” that extends through the buffer film layer and a dielectric layer, and into a semiconductor substrate over which these layers are located.

Again, Tsai does not expressly or inherently describe that a layer of isolation material may be applied over a buffer film layer such that major surfaces of the layer of isolation material and buffer film layer are in contact. Rather, in the method of Tsai, a sacrificial layer of either polysilicon or silicon oxide contacts the major surface of a silicon nitride layer, which is an example of a buffer film layer. As such, the layer of isolation material could not contact the major surface of the silicon nitride layer.

It is, therefore, respectfully submitted that Tsai does not anticipate each and every element of independent claim 25.

Accordingly, it is respectfully submitted that, under 35 U.S.C. § 102(e), independent claim 25 is allowable over Tsai.

Both claims 26 and 27 depend from claim 25, which is allowable. Therefore, both claims 26 and 27 are also allowable.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 102(e) rejections of claims 1-4 and 25-27 be withdrawn.

#### **Rejections Under 35 U.S.C. § 103(a)**

Claims 5 and 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsai, as applied to claims 1 through 4 and 25 through 27 above, and further in view of the Examiner’s Comment.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references

themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claim 5 is allowable, among other reasons, as depending from claim 1, which is allowable.

Claim 28 is allowable, among other reasons, as depending from claim 25, which is allowable.

In addition, it is respectfully requested that the Office provide some support for the assertion that, before to the earliest priority date for the above-referenced application, one of ordinary skill in the art would have known that trench fill material could be densified by annealing. Otherwise, it is respectfully suggested that such densification was not, in fact, known to those of ordinary skill in the art. Consequently, without improperly benefitting from the hindsight provided by the above-referenced application, one of ordinary skill in the art could not have been motivated to modify Tsai in the asserted manner, there would have been no reasonable expectation that the asserted modification of Tsai would have been successful, and the asserted modification of Tsai would not have taught or suggested each and every element of claim 5 or claim 28.

For these reasons, it is respectfully submitted that, under 35 U.S.C. § 103(a), claims 5 and 28 are allowable over Tsai and requested that the 35 U.S.C. § 103(a) rejections of claims 5 and 28 be withdrawn.



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### CONCLUSION

It is respectfully submitted that each of claims 1-5, 11-17, 25-28, and 33-38 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully Submitted,

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